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10/501,377	12/23/2004	George Cullen	KNN-017	4662

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EXAMINER	
TSAI, CAROL S W	

ART UNIT	PAPER NUMBER
2857	

MAIL DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/501,377	CULLEN ET AL.	
	Examiner	Art Unit	
	CAROL S. TSAI	2857	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 April 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8,10-13. 15-27, and 29-41* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *10-13 and 41* is/are allowed.

6)☒ Claim(s) *1-8,15-27 and 29-40* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *19 September 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-4, 7, 15, 16, 18-20, 22, 23, 29, 30, 32, 33-37, 39, and 40 are rejected under 35 U.S.C. 102(b) as being anticipated by U. S. Patent No. 6,262,550 to Kliman et al. (referred to Kliman et al.'550 hereafter)

4. With respect to claims 1, 15, 18, 29, 30, 36, and 37, Kliman et al.'550 discloses an electric monitoring system (motor monitoring system 10 shown on Fig. 1) comprising an antenna (radio frequency (RF) sensor 32 shown on Fig. 2) (see col. 7, line 4) and a processor (computer with communication system 15 or computer hardware 15 shown on Fig. 2) (see col. 5, lines 46-47); the antenna detecting a radio-frequency signal generated by arcing events in the electric motor (see col. 6, line 59 to col. 7, line 8); and the processor processing the radio-frequency signals generated by the arcing events in

the electric motor to determine one or more operational parameters of the electric motor (see Fig. 2; col. 5, lines 45-67; and col. 6, line 19 to col. 7, line 64).

5. As to claim 2, Kliman et al.'550 also disclose a means for screening background noise so improving the overall signal to noise ratio of the electric motor monitoring system (see col. 7, lines 10-22).

6. As to claims 3 and 4, Kliman et al.'550 also disclose a frequency matching unit such that the frequency matching unit allows the antenna to be frequency tuned so as to optimize its operation with the electric motor (see col. 2, lines 52-59).

7. As to claim 7, Kliman et al.'550 also disclose an electric field probe or a magnetic field probe (flux sensor 30 shown on Fig. 2).

8. As to claim 16, Kliman et al.'550 also disclose associating the frequency of the radio frequency signal to individual components of the electric motor (see Fig. 2).

9. As to claims 19 and 34, Kliman et al.'550 also disclose the application of Fast Fourier Transformations, so as to convert the sampled data to interpretable frequency spectra (see col. 11, lines 55-59).

10. As to claim 20, Kliman et al.'550 also disclose the application of Digital Signal Processing techniques to the sampled data so as to convert the sampled data to interpretable frequency spectra (see col. 7, lines 43-46 and col. 11, lines 38-41).

11. As to claims 22, 23, 32, and 39, Kliman et al.'550 also disclose the interpretable frequency spectra comprise frequency features that can be directly associated with one or more components of the electric motor (see col. 1, lines 20-36).

12. As to claims 33 and 40, Kliman et al.'550 disclose determining variations in the operational parameters of the electric motor (see col. 10, lines 45-54).

13. As to claim 35, Kliman et al.'550 also disclose manipulating and storing data corresponding to the radio-frequency signals (see Abstract, lines 8-12; col. 3, lines 15-22; and col. 5, lines 34-40).

Claim Rejections - 35 USC § 103

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

15. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kliman et al.'550 in view of DE003140319A1 to Lindsay et al.

As noted above, Kliman et al.'550 disclose the claimed invention, except for a balanced Faraday screened loop antenna/an unbalanced Faraday screened loop antenna.

Lindsay et al. teaches a balanced Faraday screened loop antenna/an unbalanced Faraday screened loop antenna (see Abstract, lines 1-17).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Kliman et al.'550's system to include a balanced Faraday screened loop antenna/an unbalanced Faraday screened loop antenna, as taught by Lindsay et al., in order that when the alternating magnetic field amplitude is constant,

the output signal of the antenna is free of resonances over a wide range, virtually independently of the frequency.

16. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kliman et al.'550 in view of U. S. Patent No. 6,236,227 to Kliman et al. (referred to Kliman et al.'227 hereafter)

17. Kliman et al.'550 disclose the data sampling means comprising an analogue to digital converter allows the high frequency signal, over a predetermined length of time, to be captured (see col. 5, lines 62-67 and col. 11, lines 38-41).

18. Kliman et al.'550 do not disclose expressly a high speed PCI card.

19. it is, however, considered inherent that Kliman et al.'550's computer hardware include a high speed PCI card (see col. 5, lines 45-54), because such element is known to be necessary in a standard personal computer (using an Intel Corporation with a 233 MHz Pentium II MMX processor) operating on the high speed PCI bus in order to provide better speed and reliability.

20. Kliman et al.'550 do not disclose an anti aliasing filter.

21. Kliman et al.'227 teach an anti aliasing filter (see col. 6, lines 35-41).

22. It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Kliman et al.'550's method to include an anti aliasing filter, as taught by Kliman et al.'227, in order to eliminate the noise.

23. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kliman et al.'550 in view of U. S. Patent No. 5,737,026 to Lu et al.

As noted above, Kliman et al.'550 disclose the claimed invention, except for the detection of the high frequency signals employing a non-intrusive antenna.

Lu et al. teach the detection of the radio frequency signals employing a non-intrusive antenna (see col. 12, lines 4-22).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Kliman et al.'550's method to include the detection of the radio frequency signals employing a non-intrusive antenna, as taught by Lu et al., in order to pick up the video signal radiated by the rear end of a television set's picture tube.

24. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kliman et al.'550 in view of U. S. Patent No. 5,461,329 to Linchan et al.

25. As noted above, Kliman et al.'550 disclose the claimed invention, except for the sampling providing a means for monitoring frequency modulation and amplitude modulation within the high frequency signals.

26. Linchan et al. teach the sampling providing a means for monitoring frequency modulation and amplitude modulation within the high frequency signals (see col. 6, lines 26-34).

27. It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Kliman et al.'550's method to include the sampling

providing a means for monitoring frequency modulation and amplitude modulation within the high frequency signals, as taught by Linchan et al., in order to improve motor current signature analysis (see col. 6, line 34)

28. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kliman et al.'550 in view of U. S. Patent No. 6,701,274 to Eryurek et al.

As noted above, Kliman et al.'550 disclose the claimed invention, except for Wavele Analysis.

Eryurek et al. teach Wavelet Analysis (see col. 3, line 50 to col. 4, line 19).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Kliman et al.'s method to include Wavelet Analysis, as taught by Eryurek et al., in order to allow the frequency components to be identified.

29. Claims 24-26, 31, and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kliman et al.'550 in view of U. S. Patent No. 5,434,509 to Blades.

30. As noted above, with respect to claims 24-26, Kliman et al.'550 disclose the claimed invention, except for calculating an average width of the radio frequency signals, above a predetermined level, over a number of arcing events.

31. Blades teaches calculating an average width of the radio frequency signals, above a predetermined level, over a number of arcing events (see col. 21, lines 18-42).

32. It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Kliman et al.'550's method to include calculating an

average width of the radio frequency signals, above a predetermined level, over a number of arcing events, as taught by Blades, in order that high-frequency noise characteristic of arcing on the power line and distinguishable from other sources of high-frequency noise can be determined.

33. As to claims 31 and 38, Kliman et al.'550 do not disclose determining a physical location within the electric motor according to the arcing events.

34. Blades teaches determining a physical location within the electric motor according to the arcing events (see col. 2, lines 53-61).

35. It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Kliman et al.'s method to include determining a physical location within the electric motor according to the arcing events, as taught by Blades, in order that the arcing of the motor can be located.

36. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kliman et al.'550 in view of U. S. Patent No. 6,434,512 to Discenzo..

37. As noted above, Kliman et al.'550 disclose the claimed invention, except for the additional step of self-calibration of the method.

38. Discenzo teaches the additional step of self-calibration of the method (see col. 18, lines 25-31).

39. It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Kliman et al.'550's method to include the additional step of self-calibration of the method, as taught by Discenzo, in order to maximize efficiency

and integrity of system health diagnostics and prognostics processes (see col. 18, lines 20-21).

Response to Arguments

Applicants argue that no mention of processing RF signals to derive operating parameters such as speed, load, torque, modulation, out of balance, quality of brushes etc. (i.e., operational parameters of the electric motor), therefore Kliman et al.'550 fail to teach using RF signals to determine operating parameters. The examiner disagrees with Applicants. "Industrial electrical motors are in widespread use in manufacturing, power generation and other industrial facilities. "These motors must be monitored and maintained to ensure their proper operation. *There are a wide variety of motor parameters that can be monitored to provide service personnel with information regarding the condition of a motor.* ***These parameters include dynamic operating conditions, such as vibration, speed, temperature, and stray magnetic flux that are measured by sensors on or adjacent the motor***" and "*The analysis of RF emissions from a motor is sometimes referred to as "partial discharge analysis". RF motor activity is also associated with commutator quality in DC motors, in that sparking by a DC motor emits RF spikes that are detected by the RF sensor 32. The RF sensor may be an antenna, a resistor, inductor or high frequency*

current transformer (in series with a suitable blocking capacitor if needed) connected between the motor lines, or from a motor line to ground" as described at col. 1, lines 20-20 and col. 6, line 66 to col. 7, line 8 respectively, Kliman et al.'550 clearly indicate processing the radio-frequency signals generated by the arcing events in the electric motor so as to determine one or more operating parameters of the electric motor. Therefore, Kliman et al.'550 disclose the claimed invention.

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, Kliman et al.'550 disclose the claimed invention, except for a balanced Faraday screened loop antenna/an unbalanced Faraday screened loop antenna. Lindsay et al. teaches a balanced Faraday screened loop antenna/an unbalanced Faraday screened loop antenna (see Abstract, lines 1-17), in order that when the alternating magnetic field amplitude is constant, the output signal of the antenna is free of resonances over a wide range, virtually independently of the frequency. Therefore, Kliman et al.'550 in combination with Lindsay et al. teach the claimed invention.

40. In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by

combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, Kliman et al.'550 disclose the claimed invention, except for the additional step of self-calibration of the method. Discenzo teaches the additional step of self-calibration of the method (see col. 18, lines 25-31), in order to maximize efficiency and integrity of system health diagnostics and prognostics processes (see col. 18, lines 20-21). Therefore, Kliman et al.'550 in combination with Discenzo teach the claimed invention.

41. In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988)and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, Kliman et al.'550 disclose the data sampling means comprising an analogue to digital converter allows the high frequency signal, over a predetermined length of time, to be captured (see col. 5, lines 62-67 and col. 11, lines 38-41). Kliman et al.'550 do not disclose expressly a high speed PCI card. it is, however, considered inherent that Kliman et al.'550's computer hardware include a high speed PCI card (see col. 5, lines 45-54), because

such element is known to be necessary in a standard personal computer (using an Intel Corporation with a 233 MHz Pentium II MMX processor) operating on the high speed PCI bus in order to provide better speed and reliability. Kliman et al.'550 do not disclose an anti aliasing filter. Kliman et al.'227 teach an anti aliasing filter (see col. 6, lines 35-41), in order to eliminate the noise. Therefore, Kliman et al.'550 in combination Kliman et al.'227 teach the claimed invention.

Allowable Subject Matter

42. Claims 10-13 and 41 are allowed.

43. The following is a statement of reasons for the indication of allowable subject matter:

44. U. S. Patent No. 5,434,509 to Blades in view of U. S. Patent No. 4,999,641 to Cordery et al. are references closest to the claimed invention. Blades in combination with Cordery et al. disclose an antenna for measuring high frequency radio frequency signals associated with arcing events from a brush contact in an electric motor, the antenna comprising a loop and a loop screen, and the loop screen shields the loop from background noise thus improving the signal to noise ratio of the signal detected by the antenna. However, Blades in combination with Cordery et al. do not teach the loop comprising a conductor and a screened coaxial cable such that the conductor is turned back on itself so as to form one or more turns while the end of the conductor cable is attached to the screen of the coaxial cable; and including all of the other limitations in the respective independent claims.

45. U. S. Patent No. 6,262,550 to Kliman et al.'550 is the reference closest to the claimed invention. Kliman et al.'550 discloses a method for monitoring an electric motor, the method comprising the steps of: i) Detecting radio frequency signals generated by arcing events in the electric motor; ii) Processing the radio-frequency signals generated by the arcing events in the electric motor so as to determine one or more operational parameters of the electric motor; and. However, Kliman et al.'550 do not teach iii) Performing self-calibration of the method, wherein the self-calibration of the method comprising a current measuring technique including the sub-steps of: i) Measuring the torque on the electric motor by employing the non-intrusive antenna; ii) Measuring directly the current in the electric motor so as to enable the torque on the electric motor to be calculated; iii) Taking the difference between the two methods for obtaining the value of the torque on the electric motor so providing a compensation factor; and iv) Adding the compensation factor to the non-intrusive antenna method for measuring the torque on the electric motor; and including all of the other limitations in the respective independent claims.

Conclusion

46. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Contact Information

47. Any inquiry concerning this communication or earlier communications from the examiner should be directed to CAROL S. TSAI whose telephone number is (571)272-2224. The examiner can normally be reached on M-F(8:00-4:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eliseo Ramos-Feliciano can be reached on 571-272-7925. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

June 7, 2007
Art Unit 2857

/Carol S Tsai/
Primary Examiner, Art Unit 2857